Sealing Temper-Proof Cap

The invention relates to a sealing cap for containers. The sealing cap is particularly suitable for sealing bottles for beverages, particularly plastic and glass bottles.

The commonly used system for sealing bottles for beverages, it is known to provide at the lower periphery of a plastic or metal cover a ring or several separate elements connected with the cover via cages (webs), at least a portion of the connecting cages (webs) that are broken/ruptured upon opening the bottle. The consumer can recognize there from that the bottle has already been opened. Such sealing caps, however, have the disadvantage that the cap may already be slightly opened in a way that the connecting cages (webs) are at first elongated and then broken thus permitting gas and liquid to escape and foreign elements/liquids to be introduced into the container. With carbonated pop-soda beverages or water containing carbon dioxide, this results in that, for example, the carbon dioxide escapes at least partially and the quality of the beverage suffers a deterioration there from. Further, there is the risk of a contamination of the contents of the container because of the possibility of the sealing cap being slightly opened therefore allowing the introduction of foreign contents into the container.

To avoid these drawbacks, it is known from WO 02/057141 to provide a sealing closure with two sealing caps, an inner sealing cap being surrounded by an outer sealing cap. The inner sealing cap is provided with an internal thread and adapted to be screwed onto a bottleneck. The inner cap serving as

a sealing element for sealing an outlet opening of a container, such as a bottle for beverages, comprises a closing part at its upper surface which closes a pressure compensation opening in the inner cap. Further, this surface is provided with a pulling element as well as with a catch element. The outer cap surrounding the inner cap rotates relative to the inner cap by a given angular range. At the inner surface of the outer cap opposite to the upper surface of the inner cap, an arm comprising a cutting edge is provided. By rotating the outer cap, the cutting edge of the arm removes the closing part of the inner cap thus the pressure compensation opening. When the outer cap is rotated further, the arm of the outer cap abuts on the holding element of the inner cap so that the inner cap is co-rotated. Thereby, the bottle can be opened then. Additionally, catch elements are provided at the above-described opposite surfaces of the two caps in order to avoid that the outer cap is rotated back with respect to the inner cap. As soon as the sealing cover has been opened, the closing part of the inner cap is thus removed. Since the outer cap is transparent, this can be recognized by the consumer. To this end, however, it is absolutely necessary that the outer cap is transparent. Further, the sealing cover has the disadvantage that the fact that the closing part has already been removed can be easily overlooked by the consumer.

It is the object of the invention to provide a temper-proof sealing cap whereby the certainty that the cap has not previously been opened by a third person is improved.

This object is solved, according to the invention, by the features of claim 1.

The sealing cover according to the invention comprises a sealing element for sealing an outlet opening of a container, particularly a bottle and, in a particularly preferred case, a plastic or glass bottle for beverages, carbonated and non. Preferably, the sealing element has a cap-shaped configuration. Further, the sealing cover according to the invention comprises a safety element tailored to be displaced from a closed position into an opening

position with respect to the sealing element. Before being opened first, the safety element is in the closed position and can be transferred into the opening position by being displaced, particularly twisted, once (and only once) with respect to the sealing element. According to the invention, once a safety element has been brought into the closed position, it cannot be displaced or twisted back into the opening position any more. The safety element may be an annular or cap-shaped element. Particularly, the safety (temper-evident) element may be arranged within or also without the sealing element and surround the latter particularly partially and, in the particularly preferred case, surround it completely. In order to prevent the safety element from being twisted or displaced back from the opening position into the closed position, a release means is connected with the sealing element and the safety element or rather arranged between these two elements. The release means serves to permit or release the twisting of the sealing element for completely opening the element. To this end, for example, a latch engaging into a recess of the bottle may be pulled back by the release means. Preferably, however, the release means comprises catch elements by which the safety element is connected with the sealing element so as to rotate with the latter.

To indicate to the consumer whether a bottle for beverages or another container has already been opened, an indicating means (temper-evident) is connected with the sealing element and/or the safety element. The indicating means indicates whether the sealing cover has ever previously been in the opened position. To this end, an actuating means is connected with the safety element and/or the sealing element, which serves to actuate the indicating element. In doing so, the actuating means is displaced relative to the indicating means to actuate the indicating means. The actuating means may either be provided at the sealing element or at the safety element, the indicating means being preferably provided at the other element.

The indicating means is provided at an outside of the sealing element or the safety element, i.e., at an outside of the sealing cover so that the consumer is

able to recognize as easily as possible whether the sealing cover has ever been brought into the opening position. The indicating means may be provided at the sealing element or at the safety element, the indicating means being provided, according to the invention, at an outside, i.e., at that side of the two elements that is not covered by the respective other element. In doing so, it has to be considered that the elements do not have to cover each other completely since the safety element may also be configured as a ring, for example. According to the invention, the position of the indicating means is changed upon opening, i.e. upon transferring the safety element from the closed position into the opening position. This is effected in that, for example, the indicating means is at least partially pressed out of the outside. Since this change of position occurs at an outside of the sealing element or the safety element, it is readily perceived by the consumer. Particularly, the change of position of the indicating means is also tangible so that it can be perceived by blind consumers as well. In this case, it is particularly preferred to provide the indicating means at an upper surface and not at the outer jacket surface of the sealing cover so that the indicating means is adapted to be seen and felt well. Further, the indicating means may be configured in a colour differing from that of the sealing cover, preferably in a signal colour.

The invention aims at preventing foreign bodies and/or liquids to be introduced into the container between the bottling plant and the actual purchase point, without the knowledge of the consumer, hence the temper-evident mechanism.

The mechanism according to the invention works in a way as to make the undercap (which is in contact with the liquids in the container) close — after briefly rupturing the pin — the container thus providing all the sealing properties as found in the cap prior to being opened.

In a particularly preferred embodiment, the actuating means is configured as a ramp. When displacing or twisting the safety element and the sealing element

relative to each other, the indicating means is pressed outward according to the invention. This is effected by displacing the indicating element preferably vertical to the displacement direction along the ramp and thus pressing it outward when it is displaced or twisted. The change of position of the indicating means provoked thereby is effected to the outside, i.e., in a manner that the indicating means protrudes beyond an outside of the sealing cover. Preferably, the indicating means is connected to the sealing element or the safety element via a web. When the indicating means changes its position, a separation of the web shall be preferably avoided. This can be guaranteed by preferably providing the web on the side pointing towards the ramp front end in the opening position.

The ramp as well as the indicating means can be arranged in the jacket surfaces of the sealing element and the safety element, respectively, so that the indicating means protrudes laterally outward in an upright container in the opening position . Preferably, however, the indicating means as well as the actuating means are provided at those surfaces of the two elements that are horizontal when the container is in its upright position. In this preferred embodiment, the sealing element as well as the safety element are configured as a cap, the safety element preferably surrounding the sealing element.

Preferably, the sealing cap according to the invention additionally comprises a pressure compensation means serving to reduce the pressure in the container when it is opened. Preferably, the pressure compensation means is actuated before the safety element has reached the opening position. Preferably, the pressure compensation means comprises a cutting element. By displacing the safety element, the cutting element can remove a closing part closing a pressure compensation opening of the sealing element. In the case of non-carbonated beverages/fizzy liquids the cutting mechanism and its relating pin may be optional as the concept becomes redundant owing to the lack of gas.

Preferably, the pressure compensation means is arranged within a storage room to ensure that the separated closing part does not interfere or come between the sealing element and the safety element and impair the operation of the sealing cap.

Preferably, a sealing ring is arranged in a groove of the sealing element to prevent even small amounts of gas from escaping from the container. To this end, with the sealing cover screwed on, the sealing ring is preferably arranged between an inside wall of the outlet opening of the container and a groove wall and contacts both surfaces. The groove wall is arranged within the outlet opening.

Optionally, upon cutting the pin to allow the exit of excess gas from the bottle, a mechanism is provided producing a certain noise, e. g. a. pop (like a champagne cork) or a whistle (for kids parties).

Additionally, an RFD (radio frequency device) which is a dormant chip (transponder) which can be activated by an external radio source may be included within the cap. This technology may be used for several applications, such as: substitution of codebars, inventory management, prize-givings (raffles), research, etc.

Hereinafter, the invention is explained in detail with respect to preferred embodiments thereof with reference to the accompanying drawings.

In the Figures:

Figure 1 shows a schematic perspective view of the sealing element from below,

Figure 2 is a schematic perspective view of the sealing element from above,

Figure 3 is a schematic top view of the sealing element,

Figure 4 is a schematic sectional view of the sealing element along line IV-IV in Figure 3,

Figure 5 is a schematic sectional view of the sealing element along line V-V in Figure 3,

Figure 6 is a schematic perspective view of the safety element from below,

Figure 7 is a schematic perspective view of the safety element from above,

Figure 8 is a schematic internal view of the safety element,

Figure 9 is a schematic sectional view along line IX-IX in Figure 8,

Figure 10 is a schematic perspective view of a sealing ring,

Figure 11 is a schematic top view of the sealing ring,

Figure 12 is a schematic sectional view of the sealing ring along line XII-XII in Figure 11,

Figure 13 is a schematic perspective view of the assembled sealing cover,

Figure 14 is a schematic longitudinal sectional view of the sealing cover screwed upon a bottle,

Figure 15 is a schematic enlargement of the portion XV in Figure 14,

Figure 16 is a simplified schematic diagram of another embodiment of the sealing cover, and

Figure 17 is a simplified schematic diagram of a further embodiment of the sealing cover.

In the illustrated preferred embodiment (Figure 1 - 15), the sealing element 10 (Figure 1 - 5) is configured as a cap with an internal thread 12. Thus, the sealing element 12 comprises a substantially cylindrical jacket surface 14 with several projections and shoulders. A circumferential retaining ring 16 (Fig. 4) is provided at the outer jacket surface 14. The retaining ring 16 serves to retain a safety element 18 (Fig. 6 - 9), the safety element 18, in the illustrated embodiment, being also configured as a cap and completely surrounding the sealing element 10 when the sealing cover is assembled (Fig. 14). Then, the retaining ring 16 engages into a circumferential groove 20 (Fig. 9) provided at the inner jacket surface 22 of the safety element 18 (Fig. 14).

Further, the outer jacket surface 14 of the sealing element 10 is provided with a release means with two stops 24,26 and a catch element 28. The release element serves to firmly connect the sealing element 10 with the safety element 18 (see below). A further release means 24,26,28 is provided on the opposite side of the outer surface 14 of the sealing element 14 (Fig. 5).

At an end face 30 of the sealing element 10, an actuating means 32 is provided which, in the illustrated embodiment, is configured as a double ramp. The actuating means 32 serves to actuate an indicating means 34 provided in the safety element 18 (Fig. 6-9). Additionally, there may be located a protuberance between the two caps, i. e. between the sealing element 10 and the safety element 18.

Furthermore, an annular projection 36 is provided at the end face 30 so that a storage room 38 is formed within this annular projection 36. Within the storage room 38 at the end face 30, a cylindrical closing part 40 of a pressure

compensation means is provided which further comprises a cutting element 44 (Fig. 8) provided at an inner surface 42 (Fig. 9).

Furthermore, the sealing element 10 is provided with an annular groove 48 (Fig. 4) at a cover inside. Within the groove 48, a sealing ring 50 is arranged (Fig. 14,15). When the sealing cover is screwed on (Fig. 14), an upper rim 52 of a bottleneck 54 of a container is also arranged in the groove 48. Thereby, the sealing ring 50 is compressed and has a substantially rectangular cross section so that a portion of the sealing ring is arranged between an inside wall 56 of the container neck 54 and a groove wall 58. Thereby, a sealing of an outlet opening 60 of a container by means of the sealing cover according to the invention is guaranteed. The sealing ring 50 is shown in both Figures 10 and 11.

For mounting the sealing cover, for example, the sealing element 10 configured as a cap is first screwed onto a bottleneck 54 of a container, the thread 12 of the sealing element 10 engaging into a thread 62 provided at the bottleneck. In doing so, the upper end 52 is introduced into the groove 48 of the inside of the sealing element. Thus, the container is sealed tightly. Additionally, a lower edge 64 of the sealing element contacts a circumferential carrying ring 66 of the container whereby a further sealing is ensured.

In the next step, the safety element 18 (Figure 6 - 9) also configured as a cap in the illustrated embodiment is pressed from above onto the sealing element in the correct position. The position is chosen such that a cutting edge 68 (Figure 8) of the cutting element 44 is arranged in front of the closing part 40 in a counterclockwise rotational direction. Then, two opposite catch elements 70 provided at the inside wall 22 of the safety element (Fig. 8) are arranged in counterclockwise rotational direction in front of the ramp-shaped catch element 28 which is also located opposite (Fig. 2,3) . Furthermore, the cylindrical indicating means 34 provided at the end face 72 (Fig. 6) is also

arranged, in counterclockwise rotational direction, in front of the double ramp serving as an actuating means 32.

As long as the afore-mentioned elements are located in front of the corresponding elements in counterclockwise rotational direction, the sealing cover is in the closed position in which the container has never been opened. In order to open the container for the first time, i.e., to transfer the sealing cover into the opening position, the safety element 18 is rotated in counterclockwise direction. Due to the friction between the sealing element 10 and the bottleneck 54, the sealing element 10 will not be co-rotated from the start. By the rotation, the indicating means 34 is moved toward the actuating means 32 configured as a double ramp and pressed outward by the ramp 32 when it is rotated further in counterclockwise direction so that the indicating means 34 changes its position and is pressed out of an outside 74 (Fig. 7). Because of this change of position of the indicating means 34, it is clearly visible and also tangible that the receptacle has already been opened. To avoid a loss of the indicating means 34 which would make the perception by touching harder, the indicating means 34 is connected to the safety element 18 by a web 88 (Fig. 6).

During this rotation, the catch elements 70 (Fig. 6) simultaneously glide over the ramp-shaped catch elements 28 located opposite each other and provided at the outside 14 of the sealing element 10, the safety element 18 being slightly deformed elastically in this area. After the catch elements 70 have overcome the ramp-shaped catch elements 28, they snap into spaces 76 (Fig. 2,3) between the catch element 28 and the stop 26. As soon as the catch element 70 has snapped into the gap 76, it is no longer possible to rotate back the safety element 18 in clockwise direction without simultaneously taking along the sealing element 10. It is no longer possible to continue to rotate the safety element 18 in counterclockwise direction without taking along the sealing element 10, either. Thus, the receptacle is completely opened by

continuing to rotate the safety element 18 in counterclockwise direction since the sealing element 10 is rotated therewith.

Simultaneous with the two steps described above, namely the actuation of the indicating means 34 by the actuating means 32 and the snapping of the catch elements 72 into the recess 76, the pressure compensation means 40,44 is actuated. To this end, a cylindrical projection 78 (Fig. 2) is provided centrally in the storage room 38, which engages into a cylindrical recess 80 (Fig. 6-9). Further, a nose 82 (Fig. 9) engaging into a guiding groove 84 (Fig. 2) is provided at the inside 72 of the safety element 18. When the safety element 18 is rotated in counterclockwise direction for the first time, the cutting edge 68 of the cutting element 44 removes the closing part 40 at the same time as the indicating means 34 is pressed outward and the catch elements 70 snap in. By removing the closing part 40, a pressure compensation opening 86 (Fig. 1) provided under the closing part 40 is opened. This has the advantage that a small amount of gas may escape through the pressure compensation opening 86 and the first opening process is made easier thereby. Because of the storage room 38 defined by a ring 36, the end face 30 and the inside 72 of the safety element 18, it is ensured that the separated closing part 40 remains within the storage room 38.

Now, the sealing cover is in the opening position in which the safety element 18 and the sealing element 10 are connected for rotation. Now, the sealing cover can be repeatedly screwed onto the container and off again.

In a further preferred embodiment (Fig. 16), an annular safety element 90 is arranged within a sealing element 92 configured as a cap. In this embodiment, the indicating means is provided at a jacket surface of the sealing element 92 and is actuated by an actuating means attached to the outer jacket surface of the annular safety element 90. The required release means typically comprising catch elements is also arranged between the two jacket surfaces of the sealing element 92 and the annular safety element 18. If necessary, an

appropriately designed pressure compensation means may also be provided in this region.

In another embodiment (Fig. 17), a safety element 94 is also configured as an annular ring, the safety element 94 surrounding a sealing element 98 configured as a cap along the outer jacket surface. In this case, the indicating means is arranged in the jacket surface of the safety element 94, for example, and the associated actuating means is arranged at the jacket surface of the sealing element 96. In turn, the release means, which typically comprises catch elements, is arranged between the two jacket surfaces. In this region, a pressure compensation means may also be provided, if necessary.

In the further embodiments illustrated in the two schematic diagrams in Figures 16 and 17, the sealing element 92 and the safety element 94, respectively, are also turned for the first opening process, the respective other element not being co-rotated for the moment. Only after the indicating means has been triggered by the actuating means that can be configured in the above-described way and the two elements have been connected by the release means which also may comprise catch elements, as described above, the respective other element is co-rotated and the receptacle can be opened completely.